MEDICAL OFFICERS OF SCHOOLS ASSOCIATION

The Treatment of Ringworm

BY

J. H. SEQUEIRA, M.D., F.R.C.P., F.R.C.S.

Physician to the Skin Department and Lecturer on Dermatology at the London Hospital; Consulting Dermatologist to the Radium Institute.

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Physician to the Skin Department and Lecturer on Dermatology at the London Hospital; Consulting Dermatologist to the Radium Institute.

Mr. Chairman and Gentlemen,—I am greatly honoured by the invitation to address you this afternoon, because the subject of the treatment of ringworm as it occurs in our schools is one of the greatest importance, and one, fortunately, in which we are able to record a remarkable progress. In 1895 the greatest authority on the treatment of diseases in children said: "With some trepidation I am inclined to say that a very different disease is made more of than its importance deserves, and that is ringworm. I never now attempt to treat it; I send it on to the dermatologist. I cannot cure it and very often he cannot, and sooner or later it is taken out of his hands, and either left alone or treated with ink or Condy's fluid by the herbalist, who then, having made to himself friends of the mammon of unrighteousness as far as he deems judicious, calls it cured, and thenceforth the child is let loose again upon society. I often wonder when I hear of a child with ringworm of a year's or perhaps two years' standing, and, of course, kept out of school and away from his companions all that time, what would happen to his associates equivalent to the harm that has accrued to the child and his attendants from the treatment that he has undergone. I am quite sure of this, that we should hear much less about ringworm—whether for the good or the evil of the community I will not attempt to decide—if mothers had not got it into their heads, quite erroneously, that it is a dirty disease" (1).

Gentlemen, we have passed the stage depicted in these remarks. We are now quite aware of the reasons for our

* Read before the Medical Officers of Schools Association, June 6th, 1912.

failures in the past. Our remedies, applied in the form of an ointment, or a lotion even introduced under pressure, did not penetrate sufficiently into the hair-follicles to reach the fungus. We could only cure long-standing tinea of the scalp by using an irritant antiseptic which set up a folliculitis sufficiently acute to destroy the fungus. Epilation with forceps is very tedious and painful, and often fails because the brittle infected hairs break off, leaving the infected stumps as foci for future development. But epilation is the ideal remedy for tinea capitis, and we now perform it with regularity and safety. Let us consider for a few moments how this has come about. In 1896 Freund and Schiff (2) observed that the X rays caused the hair to fall from a hairy mole, and from that time there has been a constant endeavour to utilise the depilatory action of the rays in the treatment of ringworm of the scalp. At first the applications were given in an empirical way. Short repeated exposures were the rule. The exposures were made and the operators waited till something happened. Occasionally there were brilliant results ; more often the results were incomplete, sometimes too severe, and a permanent alopecia and even dermatitis followed. We read of fifty-two exposures, thirty exposures with unsatisfactory results.

The first attempt made to systematise the dosage was by the exact measurement of the current in the secondary circuit by the milliampère-meter, the penetration being gauged by the apparatus of Benoist, while to the motor interrupter we had a tachymeter attached which counted the interruptions of the current. The spark gap was measured by the spintermeter. Owing to variations in the vacuum of the tube it was found that these measurements did not give us an accurate idea of the output of the rays from a tube, and that something more was required.

In 1903 Sabouraud and Noiré took up the subject, and, as a result of some months' experimentation, they arrived at a method of dosage. In 1904 they published a paper on the cure of 100 cases by a single application of a measured dose of X rays (3).

The details of their method need not now detain us, the essential feature being the measurement of the dose by a colour change on a pastille. At first the apparatus of Holtzknecht was used, but this was soon replaced by the pastilles of Sabouraud and Noiré. These little discs are coated with platinocyanide of barium, and their pale green tint is transformed into an orange on being exposed to a definite dose of

X rays. The pastille is placed $7\frac{1}{2}$ cm. from the anode of the X-ray tube, and $7\frac{1}{2}$ cm. from the area to be irradiated. This is the fundamental point.

For a long time we used the pastilles, exposing a circular area of the scalp to the rays until the definite change was obtained. Owing, however, to the curvature of the skull and the divergence of the rays the peripheral parts of the area irradiated received less rays than the centre, and a system of slight overlapping was necessary. By this method the whole scalp could be covered in about eight exposures, and often we were obliged to apply the rays to a triangular area left between the circles exposed.

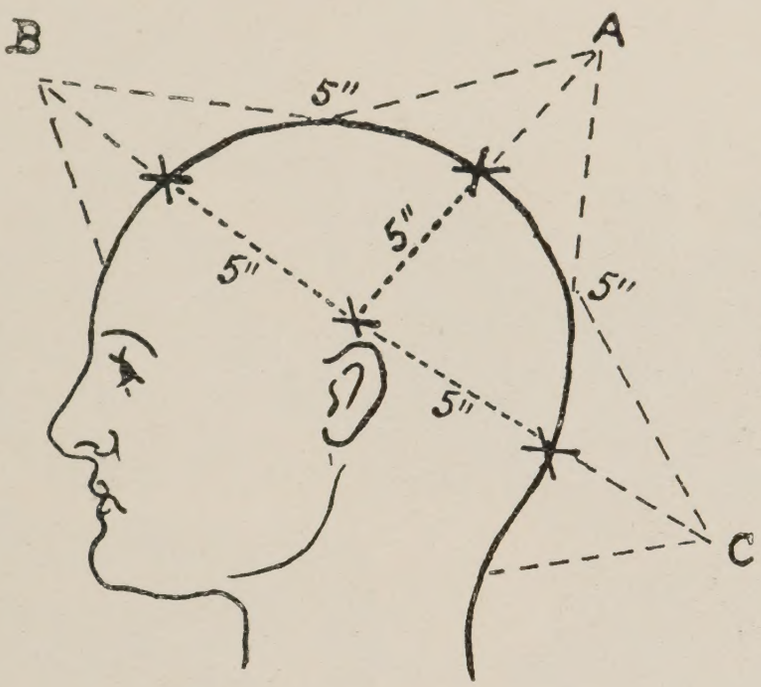
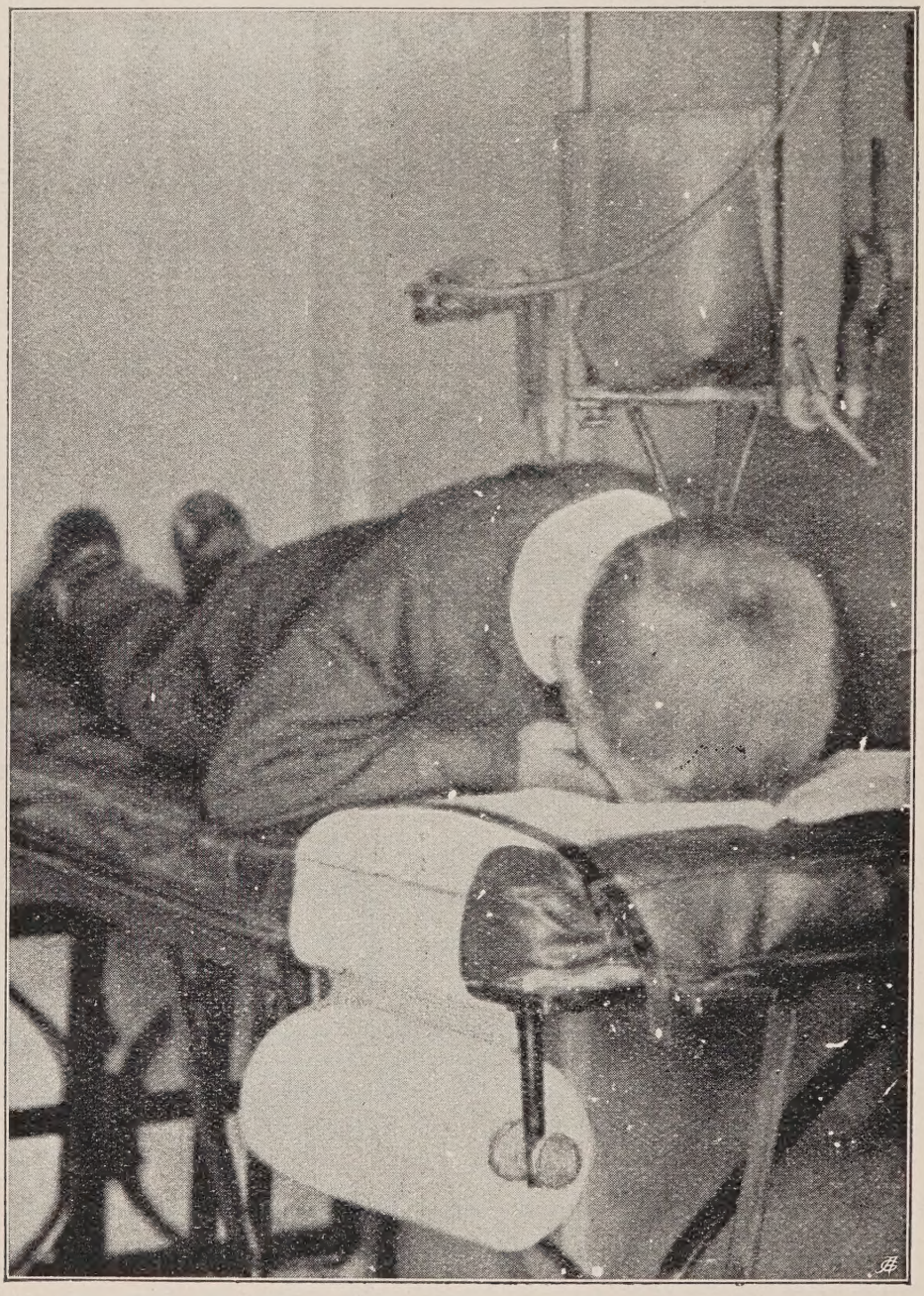


Diagram to illustrate the Kienbock-Adamson method of treating scalp-ringworm. A, B and C represent the points from which the rays emanate. Two lateral exposures are also made. The forehead, ears and nape are protected during the irradiation.

The method now adopted is an improvement upon this. It is a modification by Dr. Adamson (4) of the method of Kienbock. It consists in applying the rays to the scalp from five different points. The hair is cut close, and the distance from the margin of the hairy scalp in front to the nape is measured by a tape. At the mid point of this line a cross is made with blue pencil, and five inches in front of this another cross is marked, and also five inches behind the mid point. On each side, just above the ear, another cross is made, this cross being five inches from the centre point and five inches respectively from the anterior and posterior crosses. The X-ray tube is enclosed in a lead glass or metal shield with a

wide circular opening. To the margins of this opening are attached three wooden pegs, sloping towards each other. To make an exposure the pegs are placed on the scalp so that the cross is exactly in the middle of the points where the pegs impinge. This ensures that the scalp is at the proper distance



Patient under treatment by X rays. (From the author's *Diseases of the Skin.*)
(We owe this illustration to the courtesy of Messrs. J. & A. Churchill.)

from the anode of the tube. The rays are passed until the pastille, exactly midway between the scalp and the anode, changes to its proper orange tint. The process is repeated at each of the five points. This ensures that the whole scalp receives an equal radiation of the desired strength.

If this treatment is carried out properly the whole area so exposed is denuded of hair in fourteen or twenty-one days.

During the defluvium I usually have the scalp well washed every day, and an ointment, such as the dilute nitrate of mercury ointment, rubbed in.

It is essential to remember that X rays have no curative effect on the ringworm; they simply bring out the infected hairs. Hence, great care must be taken against infection while the hair is falling.

With a good tube it is quite easy to give the necessary exposure to each of the five areas in six minutes. This is the average time in my clinic. Allowing for the adjustment of the apparatus forty-five minutes are necessary for the treatment of the whole scalp.

The X rays were first in general use for the treatment of tinea in the London Hospital in 1905.

From September, 1905, to June, 1906, the dose was measured by the number of revolutions of the motor interrupter, milliampère-meter in the secondary circuit and Benoist's apparatus. During this period 198 cases of tinea and 24 of favus were treated.

From June, 1906, to December, 1909, the Sabouraud pastille with circular extension to the tube was used: 1291 cases of tinea and 22 of favus were treated.

From January, 1910, to May, 1912, the Kienbock-Adamson method has been employed: 1063 cases of tinea and 11 cases of favus have been treated.

In all, 2387 cases have been measured by the Sabouraud pastille in the two latter periods.

During the first period (tachymeter) three cases had areas of permanent alopecia of greater or less extent.

In the second period there were three other cases, but there has not been one since September, 1906. In no case has there been any X-ray dermatitis. The fact that no cases have occurred since 1906 points strongly to the fact that idiosyncrasy must be very rare, though its existence cannot be denied.

Occasionally an insufficient dose has been given and that has necessitated a second exposure. As a rule this can be safely done after a month's interval.

Now a few words as to the financial and scholastic advantages of this method.

Formerly it was not uncommon for children to be infected with ringworm for a couple of years, in cases of endothrix tinea even longer. In Paris the cost *per diem* for a child in the ringworm schools was 2 fr. 80 c. Thanks to the new method

M. Sabouraud introduced he was able to relieve the Assistance Publique of a capital outlay of two and a half millions of francs by removing the beds required for treatment and an annual outlay of 400,000 fr., the duration of the residence of the infected children being reduced by 80 per cent. Roughly we may say that formerly patients remained infected for an average of two years, while the new method enables them to return to school in three months.

Finally, we must discuss the real or supposed dangers of the treatment.

(1) Can the brain be injured? This is disposed of by the experience of the many thousands of children already treated. I have had a large number from different orphanages and other institutions where the after-effects, if any, would certainly be observed. In reply to a circular inquiry which I made, no single case is reported of any deleterious effect on the mentality of the children. If further proof were necessary, I may say that it has been experimentally shown that the skull of a child over three years of age is sufficient protection to the cranial contents.

(2) It has recently been stated that as many as 13 per cent. of the children treated at a certain institution during the last three years became permanently bald (5). It is certain that this is not the fault of the method from the figures quoted above. In our first period, when the pastille was not used, we had three cases in 222. In our second and third periods three cases out of 2388, a percentage of ·013.

It has recently been strongly urged that in ionisation we have a method of treatment superior to that by the X rays, and that it is eminently suitable for the treatment of small areas, and, moreover, is entirely free from risk. I am very far from convinced that this method is superior ; it is very tedious for large areas, it is not free from pain, and the penetration of the antiseptic in ionisation has been in my experience unsatisfactory. In institution work I find it rare to see cases with one patch of ringworm. When one has the hair cut short all over it is the rule to find other areas of small size in different parts of the scalp, the infection being spread by combing and brushing and also by washing. In almost every case in which I have treated one patch only at the urgent request of parents I have had sooner or later to apply treatment to the whole scalp, and I think this is the experience of all who have had much experience of this work.

I should like here to bear testimony to the admirable work

done in the recognition of ringworm by the school officers and nurses. In the frequent conflicts of opinion which inevitably occur as to when a case is cured I have found a remarkable accuracy in the observations of the school officials. The greatest difficulty in the recognition of ringworm occurs in the endothrix cases, and here I should like to say a word as to the relative proportions of fungus and the sex distribution.

Mr. H. M. Scott, who has been looking after the L.C.C. cases for me, found 89·8 per cent. were cases of Microsporon tinea, and 10·2 per cent. endothrix. This is a rather higher proportion of endothrix ringworm than is commonly recognised in the elementary schools. It is rather lower than that reported by Dr. Colcott Fox in the schools of the Metropolitan Asylums Board. As to sex, 58·3 per cent. of the microsporon cases were boys and 41·7 per cent. girls, while of the endothrix, 54·2 per cent. were boys and 45·8 per cent. girls. One wonders if the difference is real, or due to the fact that ringworm is easier to discover in the short hair of the boy.

References.

(1) An address on "Some of the Limitations of Medicine," Dr. Goodhart, Exeter, *Lancet*, November 2nd, 1895.

(2) Freund and Schiff.—*Wiener Dermat. Gesellschaft.*, May 10th, 1899.

(3) Sabouraud.—"Les Teignes Cryptogamiques et Les Rayons X," *Annales de l'Institut Pasteur*, January, 1904.

(4) H. G. Adamson.—"A Simplified Method of X-ray Application for the Cure of Ringworm of the Scalp," *Lancet*, May 15th, 1909, p. 1379.

(5) Riddell.—*Glasgow Medical Journal*, February, 1912, p. 118.

Medical Officers of Schools Association.

Meeting held at 11, *Chandos Street, on June 6th,* 1912.

Discussion on Dr. Sequeira's Paper.

Dr. Eder feared that for a considerable number of cases the X-ray treatment, though the best and most rapid, was not available. There were more cases in London than were being dealt with. He described the mode of treatment adopted at the Deptford Clinic for the many cases that could not be yet treated at the hospital by X rays; he could only claim moderate results, and was anxious to know if any more effective methods, in the absence of X-ray treatment, could be recommended. He also asked what eventually became of the large number of children who were never treated, or any way, cured, during childhood.

Dr. Procter said he felt as all present who had listened to Dr. Sequeira must feel that the X-ray treatment was to be adopted where possible, but he agreed with the previous speaker that, at present, at all events, a considerable number of cases must come up for treatment where X rays were not available.

Nineteen years ago, when he first became Medical Officer of St. John's School, Leatherhead, he had to deal with a fair number of cases of ringworm at a time when X rays were unknown. He had felt that where only one small patch was present it was possible to allow the boy to remain in the school if adequate precautions were taken to avoid spreading the disease. To secure this end the whole scalp was first disinfected and the hair over the patch and immediately surrounding it was shaved off. The shaved area was then painted with iodine and covered with a strip or strips of Mead's rubber plaster. In about a fortnight the hair grew and lifted the strapping, and this was then pulled off, epilating the diseased hairs, the patch being again shaved, painted, and once more covered with fresh

strips of Mead's plaster. The treatment was at first adopted solely with a view to prevent spread of the disease.

It was found, however, that these cases so treated got well much quicker than those treated on the then approved methods of rubbing in various germicides. He concluded that the fungus could not live if deprived of light and air, and in disseminated ringworm the whole scalp was shaved, painted with iodine and covered with strips of Mead's plaster in the same fashion as a Capelline bandage. Such cases only needed replacement of the plaster in a month or six weeks, and as a matter of fact, most of the cases were cured in about that time. Dr. Procter further said he had been very interested to find in reading Crocker's *Diseases of the Skin*, third edition, that Vidal had shown that the fungus was aërobic. Vidal had cleaned the head with turpentine painted on iodine, smeared on iodised vaseline and covered it with gutta-percha.

In answer to a question of Dr. Eder as to what became of these cases of inveterate ringworm which in former times resisted all treatment, Dr. Procter said he believed such cases underwent spontaneous cure as the patients grew older, and that though isolated cases occurred at all ages, he believed that in schools, at all events, ringworm was comparatively rare after the age of fifteen.

Dr. GRIPPER referred to the utility of treatment by X rays in minimising the transmission of infection in an institution ; under the older methods and in spite of isolation there always was a certain leakage, and infection amongst others occurred. He had not had any case for the last three years.

Dr. A. H. HOGARTH asked Dr. Sequeira what was the cost of installation of an X-ray apparatus for the treatment of ringworm with all the necessary modern improvements, and also what could be considered as a fair estimate of the cost of treatment per case, making a fair allowance for the time of the medical practitioner and for original capital outlay.

Dr. C. J. THOMAS pointed out that the presence of ringworm in the schools was the original cause of the appointment of school nurses, and that the distribution of the disease was very wide. The annual crop of ringworm in London was 6000, and the number of cases discovered was in excess of the number reported cured. The chief difficulties in dealing with ringworm from an administrative point of view are : (1) The difficulty of persuading parents that children had ringworm, especially when, as so often occurs, they are backed up by medical certification of freedom. (2) The difficulty of persuading parents careless

of their children's interest to get any treatment carried out. A child who is excluded from school is of more value economically to such parents than one attending school, inasmuch as they are able to follow some wage-earning employment, unknown, of course, to the authorities. (3) The fear of the X rays. This is not so frequent now and the prejudice is dying out. (4) The inadequacy of the existing provision for X-ray treatment.

Dr. SHRUBSALL said that parents to some extent resented methods used to check ringworm ; one, for example, said if she had any more trouble with the County Council she should send her child to a private school. He asked if any local distribution of the special varieties of fungus had been found. Formerly such a distribution had been suggested by an inquiry based on a small number of cases, the large-spored endothrix being more numerous in South than North London.

The PRESIDENT said that the Association was indebted to Dr. Sequeira for a paper which furnished a valuable and very lucid exposition of what was undoubtedly the most efficient method of treating ringworm of the scalp. This record of his experience should go far to banish prejudices based upon the drawbacks occasionally encountered in earlier days when manipulative details had not yet been perfected, and would help to make much simpler the problem of dealing with all cases of tinea capitis whenever a suitable X-ray installation and a qualified operator were available within a reasonable distance. He thought, however, that there would still remain a certain number of cases in the remoter districts, in regard to which there would be found difficulties in easily securing the advantages of adequate X-ray treatment. For these, and for such as presented only one or two isolated patches of moderate area, ionisation—admittedly effective in its results—suggested itself as a satisfactory and not less valuable alternative. The necessary apparatus was relatively inexpensive and quite portable, and the requisite manipulative skill was easily acquired. He was surprised to hear it spoken of as a painful process. He did not profess to speak as an expert; but that objection—painfulness—had not been observed by him, if only care was taken to make use of a really flexible electrode, *e.g.* one of wire gauze, or one of the "chain-mail" type, applied quite evenly and with gentle firmness over a sufficient thickness of lint thoroughly and evenly impregnated with the solution. As regards *tinea cruris* he had seen quite satisfactory results from the following method of treatment: (1) Scrubbing with a cotton-wool pad soaked in undiluted

perhydrol, until the surface was whitened for a full half inch round the affected area; (2) painting with tr. iodi; and when this was dry (3), brushing over with flexible ichthyol collodion (1 in 8); (4) one or two thicknesses of gauze impregnated with ichthyol are then plastered on, so as to well overlap the area, and a layer of ordinary cotton-wool bandaged on over all. The patient can continue to pursue his ordinary avocations; and, temporarily removing the bandage and wool, can take his daily bath, until, in the course of a few days, the gauze spontaneouly loosens and comes away, when the skin beneath appears perfectly sound and clear. There is only a slight and momentary smarting during the application of the perhydrol.

In reply, Dr. SEQUEIRA regretted that he could give no adequate explanation as to why the hair was so often curly after the application of the rays. He remembered that the exclusion of air had been given many trials and had been finally abandoned by many workers. He was interested to know that Dr. Procter had found it so successful. In reply to Dr. Hogarth, he said that he thought that a fee of one guinea per case was a fair one. The actual out-of-pocket expenses for each case treated at the London Hospital amounted to 7*s.* 6*d.* per case independent of the salary of the medical officer in charge of the treatment. In reply to Colonel Clarke he had not seen any cases of relapse after efficient epilation by the X rays; it, of course, did not exclude reinfection. Dr. Sequeira was glad to have so eloquent a confirmation of his contentions in the experience of Dr. Gripper. He was unable to give Dr. Shrubsall any evidence as to the variations in the proportion of ringworm fungi in various parts of London. His experience agreed with that of Dr. Thomas, who found that parents were difficult to persuade that their children had ringworm and also to allow them to undergo efficient treatment, as the children excluded from school were of value in earning money and running errands. He instanced a boy he knew to be suffering from favus whom he constantly saw selling newspapers in the City.

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